Usability Assessment of Online Technology Tools for Scientific Quality Publication: Basis for Institutional Research Policy Recommendations

**Gilbert C. Magulod Jr (PhD)[1], Leonilo B. Capulso (PhD)[2],
Emerlyn E. Managuas (PhD)[3] , John Noel S. Nisperos (PhD)[4],
Michael Bhobet B. Baluyot, (DHM)[5] & Albert Pagadora [6]**
[1]Cagayan State University, Tuguegarao, Philippines; [2]City College of San Fernando, Pampanga, Philippines/ San Matias National High School, Philippines; [3]University of Perpetual Help System Dalta, Philippines; [4]Don Mariano Marcos Memorial State University- South La Union, Campus, Agoo, La Union, Philippines; [4]University: Technological University of the Philippines Manila/Jose Rizal University; [6]San Roque Elementary School, Eastern Samar Region VIII, Philippines
[1]gilbertmagulod_rdecsulasam28@yahoo.com;[2]leonilocapulso@ymail.com;
[3]darlingmanaguas82@gmail.com; [4]johnnoelsnisperos@gmail.com;
[5]michaelbhobetbaluyot@yahoo.com

Abstract –*Academic institutions take initiatives to enable their faculty members to write and publish scientific articles in all fields. This paper presents the usability assessment of online technology tools for journal article publication by faculty researchers. It employed a descriptive survey research design to 21 faculty-researchers of one higher learning institution in the Philippines who served as the respondents. Data were gathered after a research article journal packaging writeshop, which was conducted for three days. The result showed that the respondents strongly agreed that the online tools such as google scholar reference manager and Grammarly software, PlagScan, and Automatic readability Tool are highly useful, accepted, and satisfying to use. They have enhanced their journal articles on lexical and grammar quality, appropriate referencing style, proper citation procedure, readability, and originality scores. This paper presents that a higher degree of the cleansing process using online resources will guarantee the quality of research articles for journal publication. Implications of this study will edify research managers and administrators to inspire faculty members to engage in a scientific publication through institutional policy recommendations.*

Keywords – *Scientific Publication, Research Productivity, Online Technology Tools*

INTRODUCTION

Development in the 21st century without research is impossible. New products, new knowledge, and new methods are the results and responsibility for scientific investigations. Research has been proven to be a critical and useful instrument for national development [1]-[3]. Research has been linked to national wealth [4]-[7], where academia plays a crucial role in educating experts, scientists, inventors, and academicians required by the economy in creating new expertise to support the national innovation programs [8],[9]. The competitiveness for state human resources relies on publishing research, patents, and information.

Scientific journals are essential media for the dissemination of scientific findings. Research journals are coined as the lifeblood of living and evolving science [10]. Writing and publishing scientific articles are the way of life in scientists' careers [11]-[14]. The publication forms the basis for new research and practical application of findings and results. It can affect the scientific community and the society at large [15] but what is lamenting is that many studies are never published and termed as the file-drawer problem [16]-[18].

The present challenges of many academic institutions worldwide are its teaching force's low research productivity [19]-[21], particularly on the research results and output dissemination beyond academia's walls [22]. The literature indicates that scholarly study findings are deeply hidden in reports

and are not translated into actual life [23]-[26]. Unfortunately, with this form of atmosphere in the academic world, several significant study results cannot meet their target audience. The dissemination of study findings cannot occur until such results are transmitted to target audiences/stakeholders for their benefits.

Reasons why articles are rejected?

There are several explanations for why journal submissions are rejected. They emerge from numerous defects like design, analysis, the format of manuscripts, findings, and discussion, conclusion, and references [27], [28]. In the parlance of medical science journals reviewed by Ezeala Nweke and Ezeala [29], the defects have been reported that insufficient introduction and background of study not adequately presented and discussed, inappropriate methods and materials and discussion are reasons why journals are not accepted. Consequently, Kapp and Albertyn [30] confirm that the rate of acceptance and rejection in journals are attributed to the common errors made by authors such as insufficient contextualization of the research, language style, referencing styles, date of references, originality of work, lack of focus, length of the manuscript, data analysis, plagiarism, and readability. The errors are manifold and various. Many researchers struggle to have their papers be published in high-impact journals. Uzuner [31] identifies problems commonly encountered in publication. Among these are associated with language problems, divergence on the journal standards, parochialism, and relevance.

Unfortunately, despite manuscript standards being released in several well-known articles, many submissions cannot reach journal requirements and are eventually refused and submitted back to the author due to quality problems. A multitudinous set of studies examined manuscripts' deficiencies regarding why they have been denied acceptance in respectable high-impact publications worldwide [32, 33, 34, 35, 36, 37 & 38].

Basic Structure of a Scientific Article

The writing of study papers for printing involves a recursive and step-by-step method combined with valuable input and assessment. The key to successful scientific writing is to start at the structure of the paper. A typical research article's basic structure follows the IMRAD sequence (Introduction, Methods, Results, and Discussion), where each of the significant components of the report addresses different aims. Nair and Nair

[39] presented a research paper's organization using the IMRAD format in communicating scientific writing.

Table 1. The IMRAD Format-Main Sections of a Scientific Paper (Nair and Nair, 2014)

Parts	Purposes
Title	What the paper covers and about
Author	Name and affiliation of authors
Keywords	Words other than those in the title that best describes the paper
Abstract	A stand-alone, short narrative of the paper
Introduction	Why this paper? The problem, what is not known, the objective of the study
Materials and Methods	How was the study done?
Results	What did you find?
Discussion	What does it mean? What next? Interpretation of results and future directions
Conclusion	Possible implications
Acknowledgments	Who helped and how; what was the funding source?
References	Details of papers cited
Appendices	Supplementary materials

Source: https://link.springer.com/chapter/10.1007/978-3-319-03101-9_2

Many scholars are not aware of online resources and guidelines which are widely accessible. This paper is meant to resolve the deplorable situation of low research publication outputs. This paper is intended to fix this problem among researchers by reminding them of free online resources to allow better journal articles to be generated. This research filled the void in growing the approval rate for papers sent to prestigious journals. This analysis review's key innovation is the usage and usefulness of online technology resources to enhance research studies' efficiency.

Technology Acceptance Model (TAM)

This research is grounded on the Technology Acceptance Model (TAM) [40]-[42]. This theory in the information system explains how users accept and adopt technology based on its usefulness, ease of use, facilitating condition, and behavioral needs. TAM's soundness, simplicity, and adaptability are considered a standard model for evaluating information systems' implementation and recognition. The usage of online technology resources, driven by TAM's dimensions, was discussed in the current research background. It would boost the faculty members by properly integrating online technology resources in ensuring the quality of their research articles. The need for academic institutions to analyze the proper use of online-technology tools as perceived by the faculty-researchers will let them identify the determinants that

will leverage its implementation and utilization for institutional research policy recommendations.

Research Objectives

This paper aims to present the usability assessment of online technology tools for faculty researchers' journal article publication. It aims to ascertain the usability assessment of the faculty-researchers using the online technology tools usefulness, acceptability, and satisfaction; and present the effectiveness of the online technology tools.

METHODOLOGY
Research Design

The study employed a descriptive quantitative research design to present the usability assessment of online technology tools. In like manner, the pre-and post-test design determines the effectiveness of online technology-based tools before and after using technology tools.

Materials and Respondents

The study protocol was reviewed and approved. To assess the usability of the tools, 21 faculty-researchers authored the manuscripts provided their evaluation. The study's conduct lasted for three days during the publication training write shop conducted by the Knowledge, technology and Management Office of the Research, Development and Extension Unit of one public higher education institution in the Philippines. The three-phase implementation process was employed. In Phase 1 of this research project, the quality of the research articles, selection criteria were set, the papers: (1) must have been completed papers that were institutionally/ externally funded for the past three years (2017-2019); (2) must not have been submitted for paper publication or under consideration to journals. Manuscript authors' name was removed and replaced with codes to ensure confidentiality. The sample size of 21 was only based on availability during the study's time.

Data Collection Procedure
Phase 1. Before the Intervention

Before starting the intervention, a university-wide publication training write shop was conducted for the faculty members who have completed research papers for three years. The publication write shop aims to package faculty researchers' manuscripts for higher chances of publication in Scopus and Clarivate Analytics. The participating faculty members were required to submit research articles in IMRAD format before the training. The participants were informed of the purpose of the activity. They were also told of the expected output for the publication training write shop. The 21 papers were scanned by the researcher using different technology tools.

Phase 2. During the Intervention

During the implementation phase, the facilitator introduced different technology tools for publication. The participants were oriented to using grammar checkers, a plagiarism scanner, a readability test, several references, and correct bibliographic entries. They were provided hands-on demonstration and walk-through sessions. The intervention period lasted for two days. The participants were provided with the online links of the different technology tools. The softwares were installed on their personal computers. During the implementation period, the facilitator instructed the participants to let their papers be processed using different online technology tools. The participants were requested to develop the documents' necessary revisions based on the scores and percentages shown by the various technology tools. They were given one day to make the revisions.

Phase 3. After the Intervention

After implementing the different technology tools and necessary revisions of papers done by the participants, their writings were internally peer-reviewed by experts and researchers in the University with publications in reputable journals—they provided feedback for the papers' improvement. After the peer review results were integrated, the author requested the documents to be scanned using the different technology tools. The workshop facilitator recorded the post result of the papers as post-calculated data.

Instrumentation

To ascertain the usability assessment of the online technology tools. An adopted and modified questionnaire was used. It contains fifteen-item questions on the usability of the online technology tools rated with 1 – Strongly Disagree to 5- Strongly Agree. The usability dimension was adopted from the Technology Acceptance Model (TAM) but modified by the researchers to suit the present context of the phenomenon being investigated. It has four dimensions, namely, usefulness, acceptability, and satisfaction.

Measurement of Variables

To analyse the gathered data from the research papers, descriptive statistics such as frequency count, mean, and percentage were used. for the usability assessment, the scale of interpretation for the variables being measured followed this range: 4.20-5.00: Very High/ Strongly Agree; 3.40-4.19: High/ Agree; 2.60-3.39: Moderate/ Undecided; 1.80- 2.59: Low/ Disagree; 1.79: Very Low/ Strongly Disagree

RESULTS AND DISCUSSION
Usability Assessment of the Online Technology Tools

This part of the article presents the usability assessment of the five online technology tools. It shows how the respondents perceived the usability of the tools in improving their scientific articles for higher chances of being accepted to reputable journals. Studies on the usability of online technologies to enhance scientific articles' quality are limited in the Philippine context.

As presented in Table 2, the google scholar's usability assessment was presented as an online technology tool to improve the respondents' quality of journal articles. Results revealed that the respondents rated the google scholar software with a very high usability assessment (x=4.58, sd=.51). It is interesting to note that they perceived it to be very useful (x=4.48, sd=.51), and they considered it with high acceptability (x=4.17, sd=.39). Moreover, they also manifested a high level of satisfaction with its use (x=. 4.17, sd=.39). The findings suggest that google scholar is an essential tool to improve the respondents' journal article's quality in finding appropriate references.

Table 2. Usability Assessment of the Google Scholar Reference Manager

Domains	Mean (n=21)	SD	Descriptive Interpretation
Usefulness	4.48	.51	Very High
Acceptability	4.17	.65	High
Satisfaction	4.17	.39	High
Grand Mean	**4.48**	**.51**	**Very High**

Legend: Strongly Agree/ Very High ᵃ (4.20-5.00); Agree/ High ᵇ (3.40-4.19); Undecided/ Moderate ᶜ (2.60-3.39); Disagree/ Low ᵈ (1.80-2.59); strongly Disagree/ Very Low ᵉ (1.00-1.79)

Google Scholar is a freely accessible search engine for scholarly literature. It contains articles, theses, abstracts, books, and court opinions from various sources such as online repositories, academic publishers, universities, professional societies, and other web sites. Such software provides scholarly works across the world. The Google scholar also effectively explores citations, related professions, publications, and authors. It locates the original links of the documents. It also has an advantage in keeping recent developments in the different research areas while one can cite publications and make a Google scholar author profile. MacEachen [43] recommends using Google Scholar for literature in evidence-based dentistry searching, highlighting seven effective techniques and features in using it.

The use of Google scholar reference manager improved the quality of the articles in its reference section. Google Scholar is a powerful online tool for searching the scientific literature. It allows for quick search and access to the materials for specific fields, journals, date of publication, authors, keywords, related research, abstract, and citations. Google Scholar is a web-based search engine cataloging millions of records coming from academic and grey literature. It collated results on the internet, which is free of use. Haddaway et al. [44] found that GS search results have a high level of transparency and capacity to update and provide critical systemic reviews since the literature search is an integral component of the research endeavor. It is capable of delivering literature for a specific study. Google Scholar as a search engine is used to search synthesis papers, methodical articles, original articles, trade publications, case studies, online books, commentaries, patents, etc. [45]-[47]. Gehanno et al. [48] studied the sufficiency of Google scholar for systematic reviews in medicine found that it is an excellent bibliographic database for systematic reviews. Researchers should use online references to look for relevant reviews of related studies and literature. The quality of papers being submitted for publication depends on the quality and number of references cited to establish the article's scientific grounding.

Table 3. Usability Assessment of the Grammarly

Domains	Mean (n=21)	SD	Descriptive Interpretation
Usefulness	4.70	.47	Very High
Acceptability	4.39	.58	Very High
Satisfaction	4.39	.50	Very High
Grand Mean	**4.49**	**.28**	**Very High**

Legend: Strongly Agree/ Very High ᵃ (4.20-5.00); Agree/ High ᵇ (3.40-4.19); Undecided/ Moderate ᶜ (2.60-3.39); Disagree/ Low ᵈ (1.80-2.59); strongly Disagree/ Very Low ᵉ (1.00-1.79)

Table 3 shows the usability assessment of the grammar software by the respondents. The data below shows that this software was rated to have very high usability (x=4.49, sd=.28). In e\its dimensions, it was rated very high on its usefulness (x=4.70, sd=.47),

acceptability (x=4.39, sd=.58), and satisfaction (x-3.39, sd-.50). It implies that Grammarly as the software is a useful tool to enhance the respondents' manuscript quality based on its grammar, lexical, and coherence aspects.

Grammarly is a cloud-based software developed by Grammarly Inc. It is an English-language writing-enhancement platform that was released in 2009 intended for checking manuscript write-ups. It is also equipped with a plagiarism-detection tool and proofreading resources with more than 250 rules in grammar. This online software automatically detects errors in grammar, word choice, punctuation, spelling, and writing style. It is equipped with algorithms and flag issues that suggest auto-corrections for grammar, style, spelling, punctuation, wordiness, and plagiarism. Correct spelling, grammar, and punctuation are predictors of writing success [49]-[51].

In the scientific publication, it is essential to note that it is the author's responsibility to have the correct language of the manuscript, making it the best possible form that would relate to the concord of grammar and spelling [52]. Grammarly tools help to prevent mistakes and improve writing skills [53]. Mungra and Webber [54] investigated the peer review process in medical research found out that lexical and grammatical mistakes, clarity, and word counts are the frequent comments and criticism of peer reviewers.

Table 4. Usability Assessment of the Google Online Citation Generator

Domains	Mean (n=21)	SD	Descriptive Interpretation
Usefulness	3.87	.69	High
Acceptability	3.43	.84	High
Satisfaction	3.83	.72	High
Grand Mean	3.71	.59	**High**

Legend: Strongly Agree/ Very High [a] (4.20-5.00); Agree/ High [b] (3.40-4.19); Undecided/ Moderate [c] (2.60-3.39); Disagree/ Low [d] (1.80-2.59); strongly Disagree/ Very Low [e] (1.00-1.79)

Perusing Table 4 displays the google online citation generator's usability assessment, which they generally assessed high (x=3.71, sd=.59). In this data, the respondents were highly satisfied (x=3.83, sd=.72) in using it. They find it highly useful (x=.3.87, sd=.69) and highly acceptable (x=3.43, sd=.84). In this sense, the respondents have noted the use of google online citation generator highly useful in improving the references they put in their manuscripts.

Google Online Citation Generator is a free search engine for Google scholar. It guides researchers to properly cite a book, magazines, news, website, journal, case studies, synthesis papers, methodical articles, trade publications, etc., using APA, MLA, Chicago, and more. Having proper citations in the reference section of the report allows the researcher to give credit to the scholarly works of other researchers in the field as well making the readers of article distinguish which ideas are personally owned and borrowed by the researcher guiding the readers to trace the intellectual ideas being presented [55]. Field of specialization of the writer also requires them to follow citation styles. The online readability tool calculates the words, syllables, number of sentences, and other characters in the article. This tool allows the writer to identify the reading level of the text. It also provides feedback if the possible audience can read the material well. The tool is useful since it makes the paper to be easily understood by science and non-science people, which is an offshoot of article impact.

Meanwhile, Plagscan has been assessed with high usability (x=3.67, sd=.38) by the respondents. They put high importance on its usefulness as an online application tool (x=3.74, sd=.75). They also manifested high acceptability (x=3.65, sd=.83) and their high level of satisfaction (x=3.61, sd=.78) in improving their research articles. The respondents perceived plagiarism detection software as an essential tool in enhancing their research articles.

Table 5. Usability Assessment of the PlagScan

Domains	Mean (n=21)	SD	Descriptive Interpretation
Usefulness	3.74	.75	High
Acceptability	3.65	.83	High
Satisfaction	3.61	.78	High
Grand Mean	3.67	.38	**High**

Legend: Strongly Agree/ Very High [a] (4.20-5.00); Agree/ High [b] (3.40-4.19); Undecided/ Moderate [c] (2.60-3.39); Disagree/ Low [d] (1.80-2.59); strongly Disagree/ Very Low [e] (1.00-1.79)

Plagiarism identification is one of the problems because journal articles are rejected. It is safer and better for all academic environments to use tools to spot plagiarism, avoid or remove theft, copy, and deleting papers. Plagiarism detection software already predicts scientific articles' quality for publication [56]-[58]. Tools that detect plagiarism are useful for the academic and scientific community. Since scientific publication is an ultimate output of scientists, they are obliged to adhere to the ethical, legal, and moral standards acceptable for the scientific community [59]. Fraudulent results and plagiarized text corrupt scientific literature's essence [60], [61]. In the study of Stretton et al. [62] papers are being retracted because of misconduct and plagiarism.

Finally, Table 6 draws that the online readability tool was rated with high usability (x=4.15, sd=.50). In using it, the respondents were highly satisfied (x=4.04, sd=.77). They noted its very high acceptability (x=4.57, sd=.73) and a high usefulness level (x=3.83, sd=.1.30). This finding shows that the respondents' considered the use of automatic readability tools as an essential online tool in enhancing their research articles' quality. The readability of the material constitutes its style and comprehensiveness to bring its scientific essence to the world.

Table 6. Usability Assessment of the Automatic Readability Tool

Domains	Mean (n=21)	SD	Descriptive Interpretation
Usefulness	3.83	1.30	High
Acceptability	4.57	.73	Very High
Satisfaction	4.04	.77	High
Grand Mean	4.15	.50	**High**

Legend: Strongly Agree/ Very High [a] (4.20-5.00); Agree/ High [b] (3.40-4.19); Undecided/ Moderate [c] (2.60-3.39); Disagree/ Low [d] (1.80-2.59); strongly Disagree/ Very Low [e] (1.00-1.79)

The readability of a journal article is an essential component of scientific reading. The readability describes the easiness in which a research article can be read. Plavén-Sigray et al. [63] confirm that in scientific reporting, clear and accurate reporting is an essential part of the scientific process. The clarity of written text can be easily quantified using readability formulas to estimate the articles [64]-[66].

Journal articles should keep practitioners informed on the current trend and development in their field of specialization. A well-published report should be easily understood by others to effectively and completely comprehend its content [67]-[69]. Likewise, Gyasi [70] affirmed that academic journals are vehicles of information in which the research findings are presented. In the study of Severance and Cohen [71], they examined the readability of medical journals found out that the difficulty level of reading abstract medical journals raised issues on the accessibility of medical research to reach the wider audience. Therefore, readability is a metric that successfully brings information to large groups of people [72], [73].

CONCLUSION

This paper suggests using online technology tools that will facilitate the quality of articles to be submitted for publication. Research publication as global scholar merchandise requires authors to put their writing in well-prepared manuscripts that will be read by a broad audience. This paper presents the usability assessment of five online-technology tools in enhancing the quality of a scientific journal article. Using a descriptive quantitative research design to 21 faculty-researchers, results revealed that google scholar reference manager and Grammarly software were rated with very high usability while Google Online Citation Generator, PlagScan and Automatic readability Tool with high usability. The study highlighted that using the online tools improved the papers' quality on grammar and lexical quality, similarity index, readability index, number of references, number of correct bibliographic entries for submission in high impact journals. Implications of this study will further develop the research writing competence of the academic community to creatively and effectively disseminate the results of their research studies with higher chances of being accepted in respected global databases as their contribution to knowledge generation and development of the country in terms of scientific publication as the measurement of human intellectual capital.

Implications to Practice

This paper presents the technology-based tools and their links that researchers can use to enhance their research manuscripts as an implication to practice. The adoption of online technology tools provided a better quality of the papers. Having adequate knowledge and skill in using the different online technology tools will eventually increase publication likelihood in reputable journals. Submitting articles for journal publication is a competitive race since many papers are being introduced to other journals. Therefore, only the best manuscripts being submitted get the editors' attention. This portion of the article presents the various online technology tools utilized in the study to ensure the manuscripts' quality standards. Table 7 shows the online links of the different technology tools.

Table 7. Online Technology Tools

Technology-Based Tools	Online Links
1. Google Scholar	https://scholar.google.com.ph/
2. Grammarly	https://www.grammarly.com
3. PlagScan	https://smallseotools.com/plagiarism-checker/
4. Online Citation Generator	http://www.citationmachine.net/
5. Automatic readability Tool	http://www.readabilityformulas.com/free-readability-formula-tests.php

Implications to Policy Recommendations

As an implication to policy recommendations, there is a need for academia to strengthen research writing and publication skills of its faculty members. The appropriate policies can be derived from this study will be the following: (1) Institutionalization of research policy utilizing the use of online technology tools from gap identification and problem identification to final research report writing; (2) Funding, subscription, and establishment of research and knowledge center for universities and schools where these online technology tools will be hosted and housed. In such a way, quality of research outputs is guaranteed; (3) Conduct of regular face to face or online research training to faculty members on research article publication and utilization; (4) Institutionalization of policies on research article journal publication incentive for faculty members and researchers; (5) Policy on the conduct of research results and utilization fora for the academe to ensure that research outputs and knowledge generated from research will be utilized and extended to the target audience; (6) Enhancement of computer literacy skills of the faculty members through trainings focusing in using these technology tools can be initiated.

Limitations and Future Research Direction

As to the limitation of the present study, there is a small number of participants and articles were only considered, and it is only limited to a short period. As future research direction, another analysis may be conducted using the online technology tools and track how many papers will be accepted in an actual journal submission. Notwithstanding the limitations, this study highlights researchers' necessary actions to encourage them to utilize free available quality assurance tools to establish a higher quality of their papers, promoting an influential research culture of universities. This study could serve as a useful reference to improve manuscript preparation and organization. Additionally, other available software tools ensure the quality of research articles and improve the article's quality. Nevertheless, the technology tools utilized in the study must not be seen as the mandatory regulations in which researchers and students must use for scientific writing. They are still encouraged to opt for possible best strategies which suit their interest and habits.

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